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Informatics in Turkey

In the last 20 years the rapid change in the informatics sector has had economic and social impact on private and government activities. The Supreme Council for Science and Technology of Turkey assigned highest priority to the informatics in its meeting at February 1993. With this advice TÜBİTAK (The Scientific and Technical Research Council of Turkey) intends to give a strong impulse to development of a research policy in this field.

Computer Hardware and Software Market in Turkey

According to an international survey on the computer hardware and software market in Turkey, the results of the survey show that in 1993 SOHO (Small Office - Home Office) market was in the first place and a general growth in the sector is about 10.33 % with a total amount of 778 Million USA Dollars. The sale-based distribution in the sector is as follows; 35% Single-user systems, 27% Multi-user systems, 17% Service and support, 14% Software, 7% Printers (Fig. 1)

Percentage Distribution of First Hand Sales of Computer Good and Services (1993)

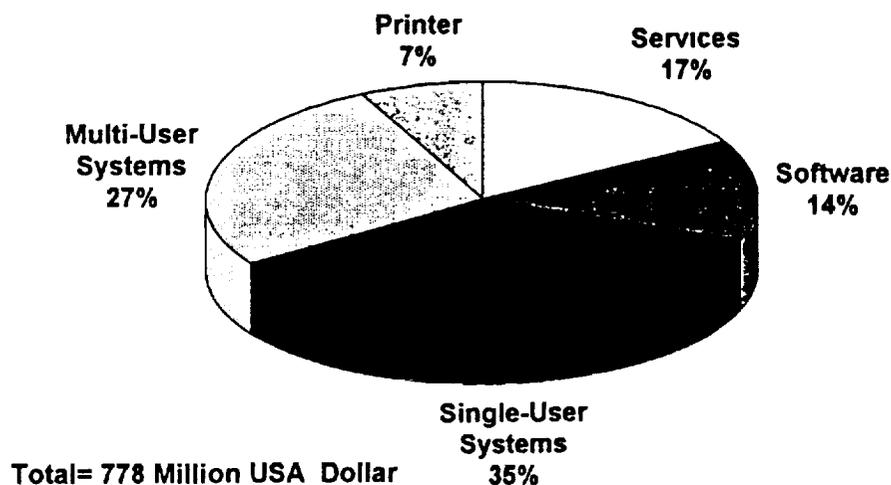
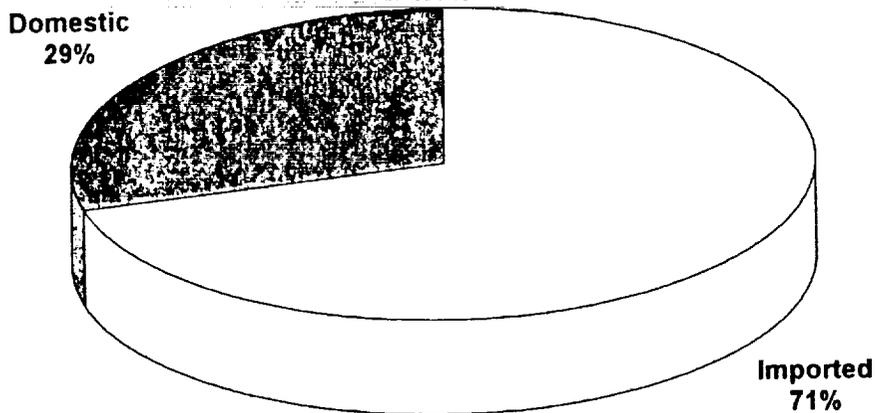


Fig. 1

In 1993 172.000 PC were sold which corresponds to 67.34% growth rate. The market share of local PC producers increased in this year. Because of the governmental restrictions and the appearance of the high speed small systems the sales of the multi-user systems decreased about 15.6%. However the acceleration was not as high as in the period 1991-1992.

The year 1993 for the software market in Turkey was relatively better than the previous years. Although 70% of the software is imported, the sales of the local software producers increased by an amount of 56% relative to 1992 (Fig. 2). Turkey-based companies' software sales has been developing at an annual compound rate of 72% between 1985-1990 and 45.5% between 1987-1992. In dollar terms, the annual increases in software turnover of companies in industry was 35% from 1987-1989 and 65.5% 1990 (Fig. 3). The export volume of the software is almost negligible,

Sources of Software (1993)



Total Market = 90 Million USA Dollars

Fig. 2

Software Market in Turkey

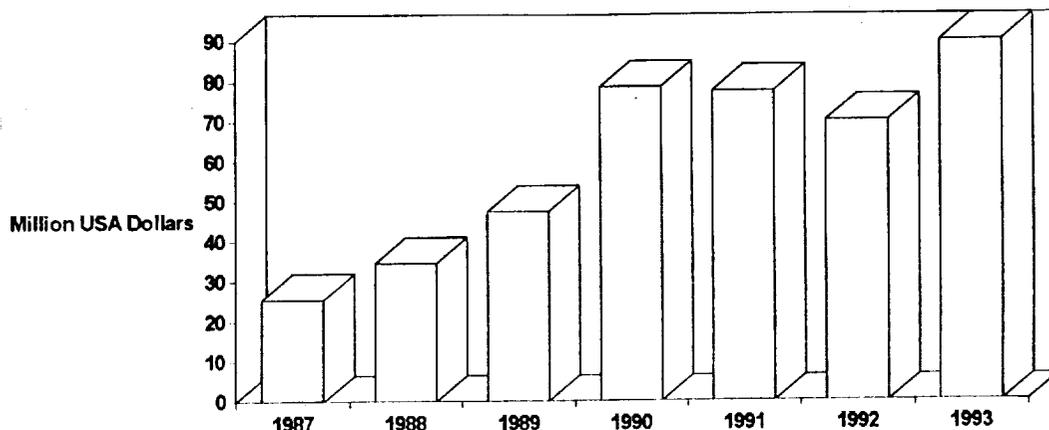


Fig. 3

The hardware market between 1992-1993 increases from 379 million dollar to 404 million dollar with a growth rate 6.7 %. In the same period the multi-user systems decreased 15.6%. This trend can be explained with the downsizing of the systems. Market share of the computer systems in 1993 is given in Fig. 4. Small systems (less than 10.000 dollar) have the largest part in the market (41%). Middle range systems (10.000 to 1 million dollars) and large systems (over 1 million dollars) sales are almost equal with 30% each.

Market Share of Computer Systems

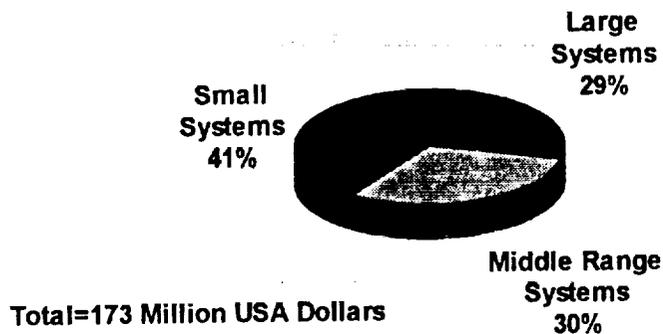


Fig. 4

Hardware market in Turkey is increasing almost with a constant rate between the years 1990 - 1993 (Fig. 5). Hardware investment growth has an averaged 35% per year. The public sector hardware investment is almost two-fifths of the market for large systems and less of the personel market. Public sector have traditionally been biased towards larger and more expensive systems. The mainframe-based computer structures are still using at universities and public sector. Some universities e.g. METU (Middle East Technical University), Bilkent University changed their computer architecture to the clinte/server systems however this type of systems are not commonly used.

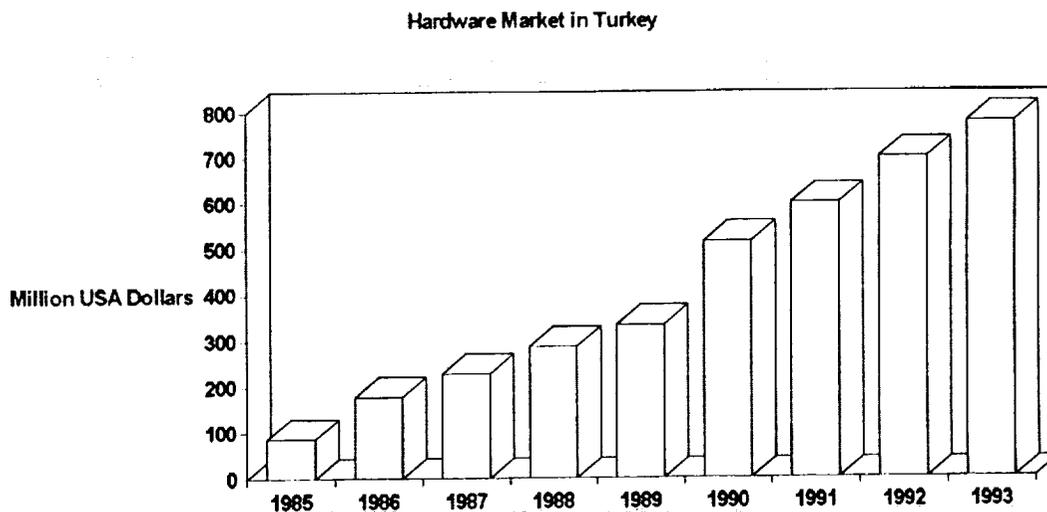


Fig. 5

Recently the discussions on the problems like the requirements analysis, procurement, agency reengineering and standarts started in public sector. There are several national focal points on informatics like National Computer Committee, TRNET (Turkish INTERNET Group), BD (Bilişim Derneği-Informatics Union).

Information Work Force

The average age of Turkey's population is significantly lower than that of other OECD countries. It seems that this will continue to grow older in OECD countries (except Turkey). In this respect Turkey has an advantage over other OECD economies in the development of information workforce prepared to the latest information technology. Structural transformation of the Turkish economy over the past decade shifted resources from agriculture towards industry and services. As the economy became more information based, this transformation translated into exceptionally high rates of growth in demand for informatics specialists.

In Fig. 6 the number of the demand of the informatics professionals in Turkey are given. The number of the staff estimated from the value of the computer park. Private supply is an estimated residual; and assumes that the forces respond to supply/demand gap. Vocational schools seem to play an important role as the source of informatics skills.

Relative growth rates of the work force within informatics sector are 68% in software, 36% in hardware and 7% in information technology graduates respectively. Universities have the central position within the system for the development of the high skill informatics professionals. They provide the linkage with the international developments in informatics and high level research in informatics is done at the universities. TÜBİTAK has an important role in preparation and implementation of the national informatics policy. The private sector in Turkey has a high proportion of investment in specific informatics skills.

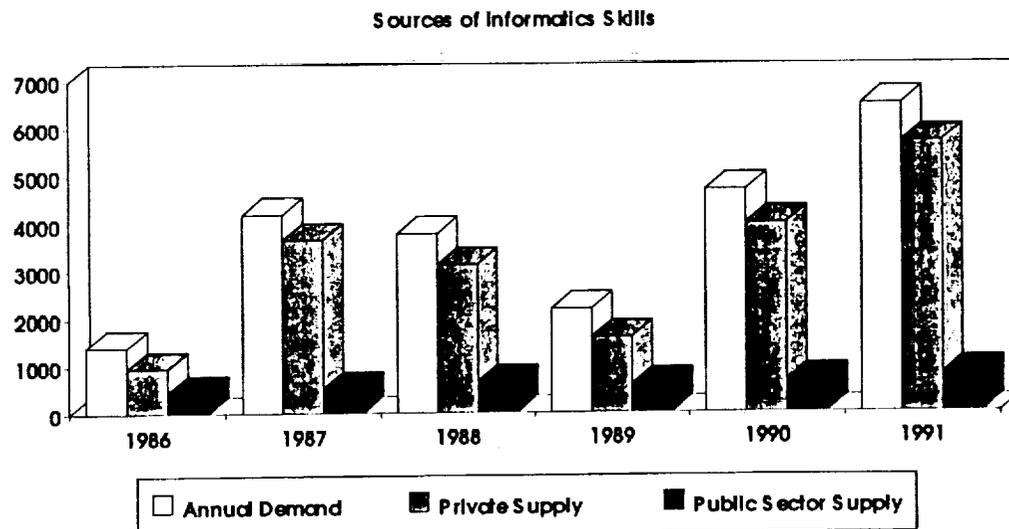


Fig. 6

In Turkey there are 15 universities offering a four-year computer engineering program. About 3000 undergraduates and graduates are attending to these programs. The number of teaching staff at the public universities is around 300. Teaching staff

includes Professors (Full, Associate, Assistant) and instructors. Undergraduate enrollments have been increased considerably since 1980's. However this growth is still behind the growth rate of the national informatics market.

In 1991, TÜBİTAK established a Software Research and Development Center (TÜBİTAK/SRDC) aimed to develop specific softwares.

Some private training centers were established in the first half of 1980's (almost all of them are in Istanbul, Ankara and Izmir). By 1993 there were a total of 500 technical courses providing computer training focused on software and programming. These technical courses have played an important role to supply the need of computer operator market.

The universities supply the core of informatics professionals with high level training and they occupy positions to manage and influence the other informatics personnel and play a gateway role between high technology and the informatics applications in the market. In Fig. 7 the sector composition of demand for informatics professional for private and public sector is given.

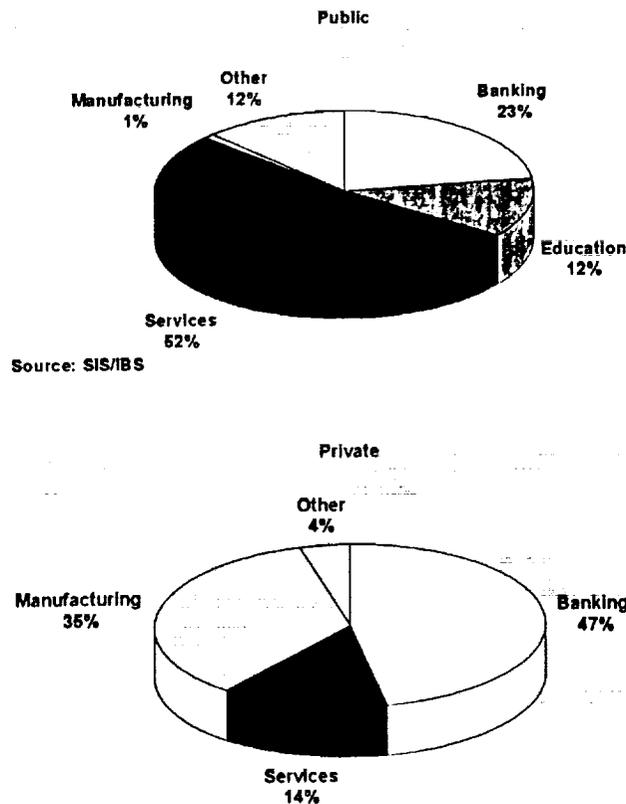


Fig. 7 Sector Composition of Demand for Informatics Professionals (1991)

Information Activities in Turkey

In 1993 TÜBİTAK Informatics Division initiated a nation-wide survey in order to determine and evaluate the existing level of national information activities. The survey covered all type of organizations in various sectors, namely government, industry, academic institutions, professional organizations and societies and international or foreign organizations located in Turkey. The questionnaire was designed to gain awareness about the organization and their activities. The questionnaire was sent to 324 organization and 248 of them had responded to the survey. 100 of which were eliminated because of irrelevance.

Distribution of Information Centers in Turkey

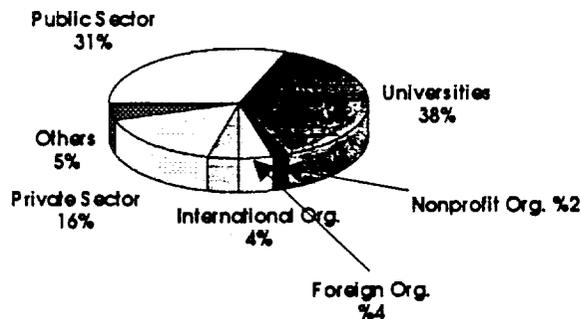


Fig. 8

The sectoral distribution of information institutions is given in Fig. 8. Almost 70% of the total institutions belong to the government. The type of information institutions were evaluated also to their functions and activities. About half of this units defined themselves as information and / or documentation centre. 10% could be considered as data centre which provide and handle the numerical data and 5% as information analysis centre which collect analyse and disseminate the data.. 15% of the units has only library that provides and facilitates the use of their special collection. 30% of the information and documentation centre are capable of producing their own databases. Only TÜBİTAK's bibliographic National Scientific and Technical Databases are on-line accessible with 15000 records (July 1994). The other data bases are used for in-house activities while some of them are used to provide information to users from other institutions.

Most of the information and documentation centres provide the information to users either by on-line or CD-ROM access and by library facilities. About 30% of the information centres have on-line access to various databases from 30 different

foreign information centre. Among those centres, DIALOG is the most widely used then STN International is in the second place. 45% of the information centres provide information by accessing CD-ROM databases with 50 different titles. The most widely used CD-ROM database are MEDLINE (56%) and Science Citation Index (23%). Seventyfive percent of the units have library and 22% have subscription of more than 1000 titles of periodicals and serials.

The total number of personnel working in these centers is about 1500. In general 36% of these are professionals (subject specialist, computer engineers, librarians and technicians) and 64% are non-professionals and ancillary personnel. The distribution of the professionals personnel varies according to the sector. The percentage of professionals is 60% in private sector and only 23% in universities and 45% in governmental organizations.

The sectoral classification of the units was determined by the evaluation of the organizational affiliations. 40.3% of the information units belong to governmental organizations, 37.5% to academic institutions, 5.6% to private sector and 16.6% are part of other sectors which include the professional organizations and societies and international or foreign organizations or agencies located in Turkey.

The subject field of interest differs according to the sector. In general 19% of the services cover all fields of Science, Engineering, Natural, Social and Life Sciences have almost the same portion (Fig. 9).

Distribution of Information Centres by their Subject Field of Interest

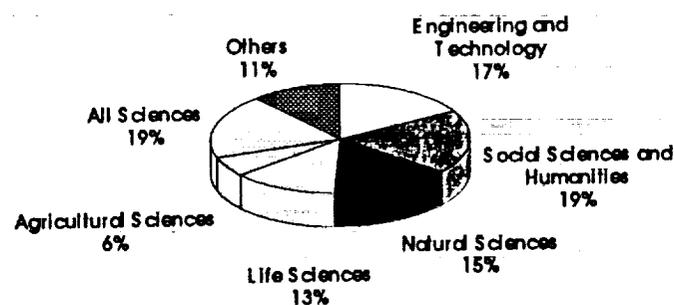


Fig. 9

In 1992 TÜBİTAK's Information Services Department started to produce the bibliographic National Scientific and Technical Databases (NSTD). The databases cover about 300 national periodicals serials published in Turkey and 3000 scientific and technical reports of the projects founded by TÜBİTAK. Both Turkish and English

languages are used in databases. International thesaurus has been chosen. The number of the records of NSTD reached to 15.000 (June 1994). The database is both online and offline accesible.

TÜBİTAK's Information Services Department is the leading information centre in the country. In Fig.10 the historical development in the search request to the Information Services Department is shown. The number for 1994 is an extrapolation. Despide the increase in the number of computers and acces to the international global networks, the search request still grows.

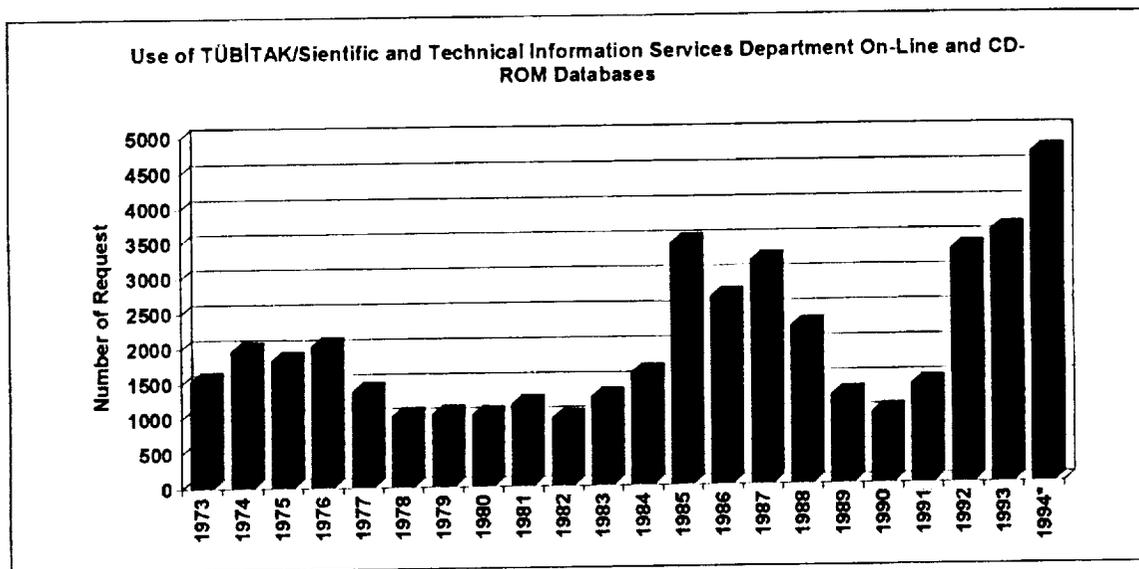


Fig. 10

National Computer Network

At the beginning of 1980's the global computer networks were used especially by universities and research centres. BITNET technology was the common protocol throughout Turkey. In 1991 a TÜBİTAK supported INTERNET project was started by a group from TÜBİTAK and Middle East Technical University. In April 1993 INERNET is oppened to common usage with a 64Kb/s link to NSF. The number of institutions that have acces, increased rapidly (at the mid of 1994 almost 300). Turkey's INTERNET traffic inflated with a very high rate and reached 30th position among the 120 countries. Turkey's INERNET backbone is shown in Fig. 11. A 64Kb/s link between Ankara - Istanbul is available and the links Ankara-Izmir and İstanbul-Izmir are in progress. For the year 1995 a second 128Kb/s linternational link is planned.

TURKEY'S INTERNET BACKBONE

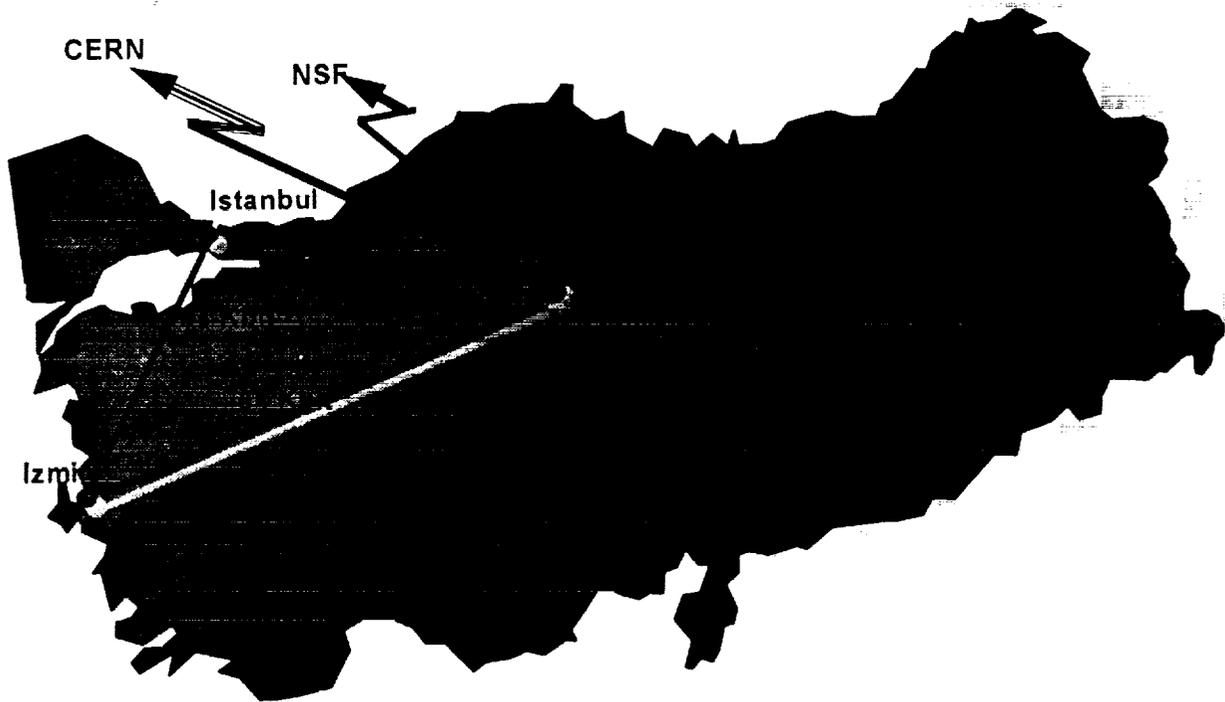


Fig. 11

Fig. 12 shows the history of Turkey's international INTERNET traffic

TURKEY'S INTERNET TRAFFIC

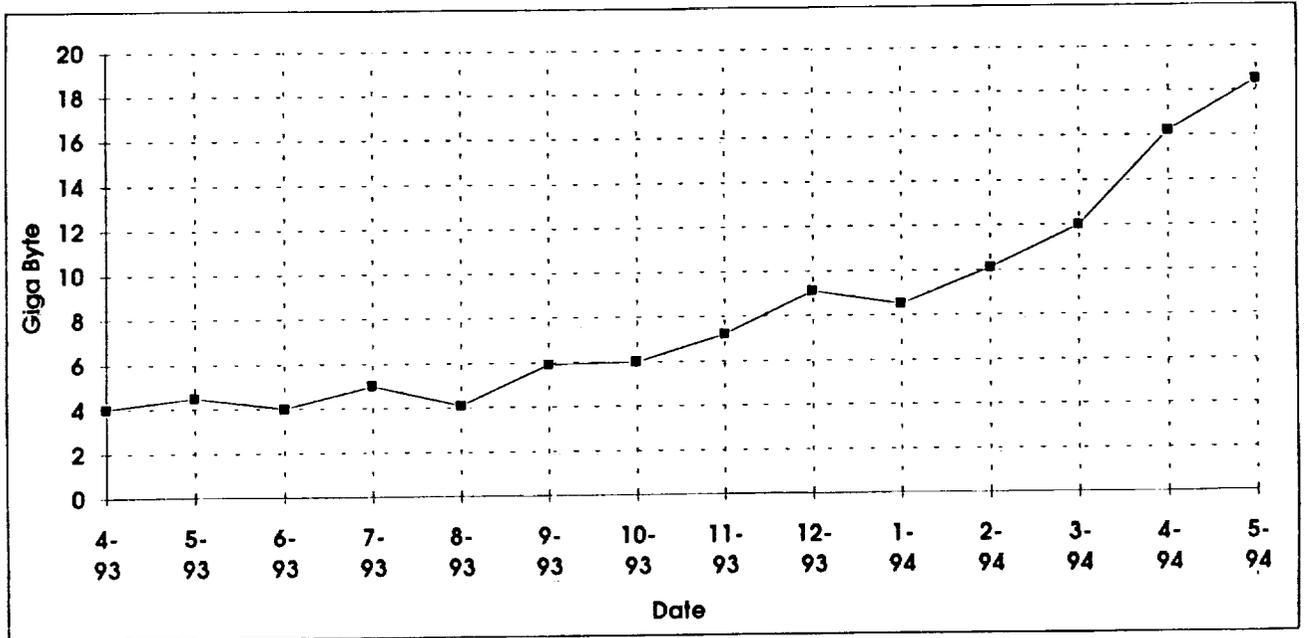


Fig. 12

In Fig. 13 the main nodes of the national INTERNET network are shown. Most of the connections are at low speed X.25 lines.

INTERNET NETWORK



Fig. 13

In the light of recommendation from a number of European committees a group of representatives was established in 1993 by national and European Commission nomination. TÜBİTAK represents Turkey in this group. As a strategic action, the EUREKA Project EuroCAIRN (European Co-operation for Academic and Industrial Research Networking) was established. After several meetings the following conclusions were reached;

- *an immediate support to upgrade pan-European data communication from the current highest 2Mb/s to 34Mb/s access capacity as the first evolutionary stage.
- * a permanent group of high level government representatives should be established to provide the framework for better co-ordination of policy issues.
- * central and eastern European countries should be involved in the evolving pan-European telematic networks and services, and additional intercontinental links and contacts should be established (for example with US, Canada, Japan)

In the framework of NATO Science for Stability Program, a project is carried out by the Information Technologies Department of TÜBİTAK to facilitate communication, data transfer and access to international network resources and databases in the marine research institutes in the Black Sea Riparian Countries, namely: Turkey, Bulgaria, Romania, Russia, Ukraine and Georgia.

This project will be a basis for further work and be combined with other similar efforts in Azerbaijan, Kazakhstan, Turkmenistan, Iran, Pakistan and Kyrgyzstan. Turkey will play a important key role within the area from international computer networking point of view.

Turkey is a strong candidate to be a regional networking service provider for Internet and BITNET with her experience and knowledge in networking applications together with modern telecommunications infrastructure which provides a big advantage in networking.

References:

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- 2) The Software Market in Turkey, *The International Bank for Reconstruction and Development, Report No: 111-A*, 1991
- 3) The Determination of Software Needs of Organizations, *TÜBİTAK*, 1991
- 4) Research and Development on Information Technology in Turkey, *TÜBİTAK Working Paper*, 1994
- 5) Computer Market in Turkey, *A Survey of International Data Corporation (IDC)*, 1994
- 6) Employment and Training Project: Republic of Turkey, *OECD Report No 10331-TU*

About the Speaker

Education:

BS in Physics (Department of Physics, Middle East Technical University/METU-1978)
Ph.D. in Physics (Max-Planck Institute for Extraterrestrial Physics, Munich, Germany-Department of Physics, Middle East Technical University/METU-1987)
Assoc. Prof. Dr. In Physics (Department of Physics, Middle East Technical University/METU-1991)

Scholarships:

METU Undergraduate Scholarship (1975-1978)
Max-Planck Institute Ph.D. Scholarship(1979-1983)

Foreign Languages:

German, English

Research Experiences:

Plasma Physics Group at Max-Planck Institute for Extraterrestrial Physics, Munich, Germany-1979-

Air Force Geophysical Research Institute, Boston, USA (1982)

Plasma Physics Group, METU 1983-

Professional Positions:

Student Assistantship Department of Physics, METU (1976-1978)

Research Assistantship, Department of Physics, METU (1983-1988)

Instructor Department of Physics, METU (1989-)

Science Advisor, Scientific and Technical Research Council of Turkey (TÜBİTAK) (1991-1992)

Head of Informatics Division of TÜBİTAK (1993-)

Lectures given at METU:

Electromagnetic Theory (undergraduate and graduate)

Computational Physics (undergraduate)

Plasma Physics and MHD (undergraduate)

Modern Physics (undergraduate)

Supervised Thesis:

Vatankhah Saeideh, Magnetohydrodynamics Rayleigh-Taylor Instability (MS 1991)

Gity Samadi Hosseinali, Transport Of Ions in Matter (MS 1991)

Aliekber Akdağ, Open Systems in Plasma Physics, (MS 1993-)

Research Interest:

Ionosphere Plasma Instabilities with Max-Planck Institute for Extraterrestrial Physics, Munich, Germany

Modeling of Plasma Systems with Max-Planck Institute for Extraterrestrial Physics, Munich, Germany

Communication in Ionosphere with Max-Planck Institute for Extraterrestrial Physics, Munich, Germany

Computer Modeling and Plasma Potential Calculations in Open System with Prof. Dr. Viladimir Mirnov

Publication List

Haerendel, G., Bauer O.H., Çakır, S., Föppe, H., Rieger, E., and Valenzuela, A., Colored Bubbles: An Experiment for Triggering Equatorial Spread-F, in Active Experiments in Space, ESA, SP-195, p.295.1983

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Haerendel, G., Valenzuela, A., Föppe, H., Çakır, S., und Bauer, O., Ein Experiment zur Auslösung von Aequatorialem Spread-F, *Deutsche Physikalische Gesellschaft Tagung*, 14, 177, 1983

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Çakır, S., Haerendel, G., and Eccles, J.V., Modeling the Ionospheric Responce to Artificially Produced Density Enhancements, *J. Geophys. Res.* 97, A2, 1193 - 1207, 1992

Haerendel, G., and Eccles, J.V., Çakır, S., Theory for Modeling the Equatorial Evening Ionosphere and the Origin of the Shear in the Horizontal Plasma Flow, *J Geophys. Res.* 97, A2, 1209 -1223, 1992



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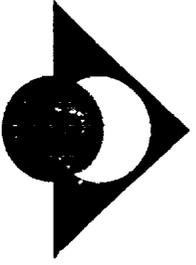
SCIENTIFIC AND TECHNICAL INFORMATION (STI) ACTIVITIES IN TURKEY

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TÜBİTAK

Scientific and Technical Information Activities In Turkey

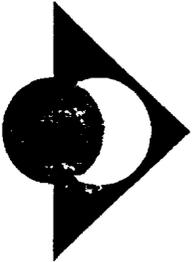
- **Science and Technology Policy
in Turkey**
- **Computer Hardware and
Software Market in Turkey**
- **National Survey on Information
Activities**
- **TR-NET (Turkish INTERNET
Project Group)**



Science and Technology Policy in Turkey

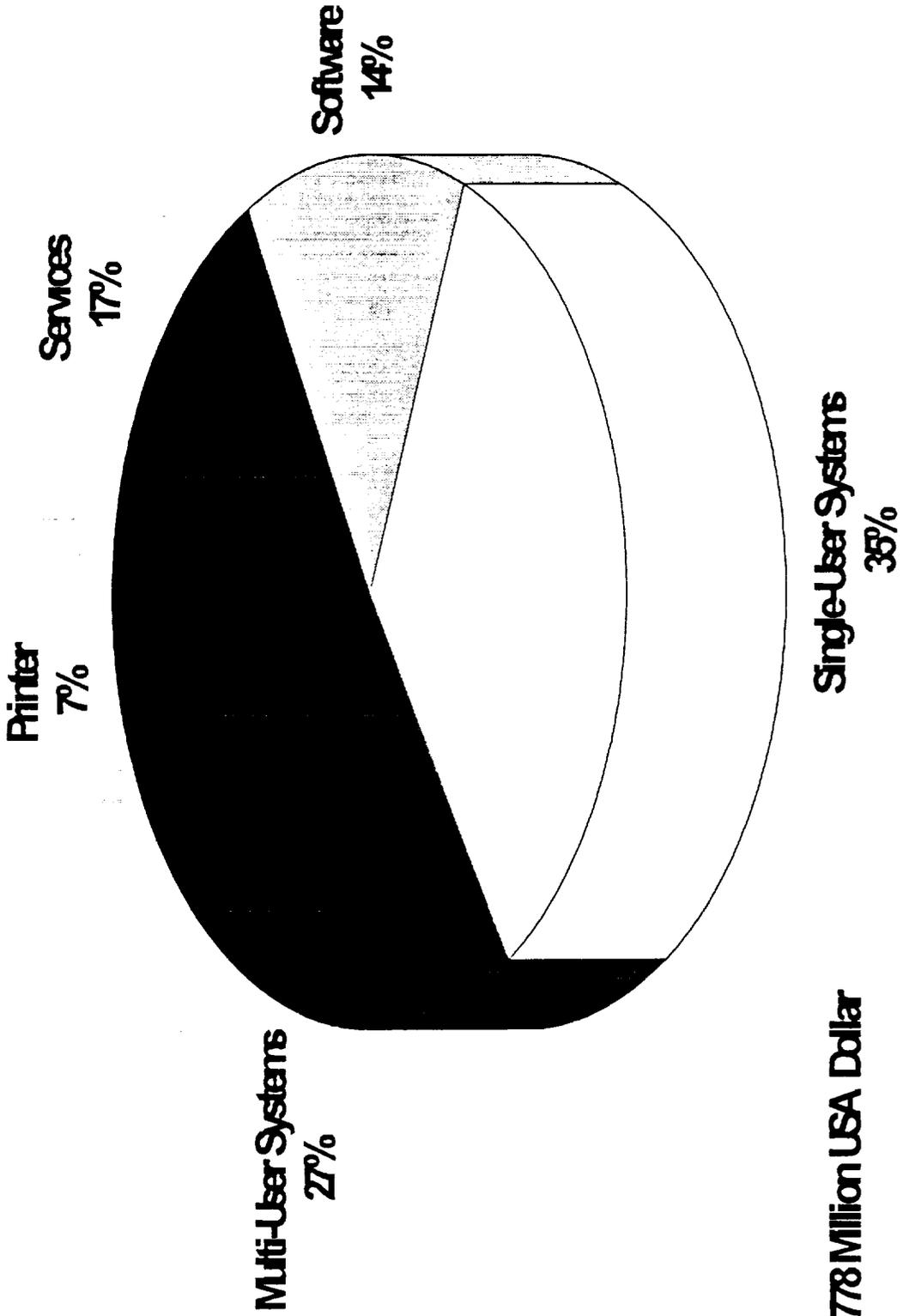
• **Priority Areas Identified by the Supreme Council for Science and Technology of Turkey (February 1993):**

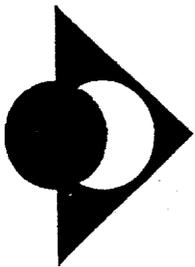
- **Informatics**
- **High Technology Materials**
- **Biotechnology**
- **Nuclear Technologies**
- **Space Technology**



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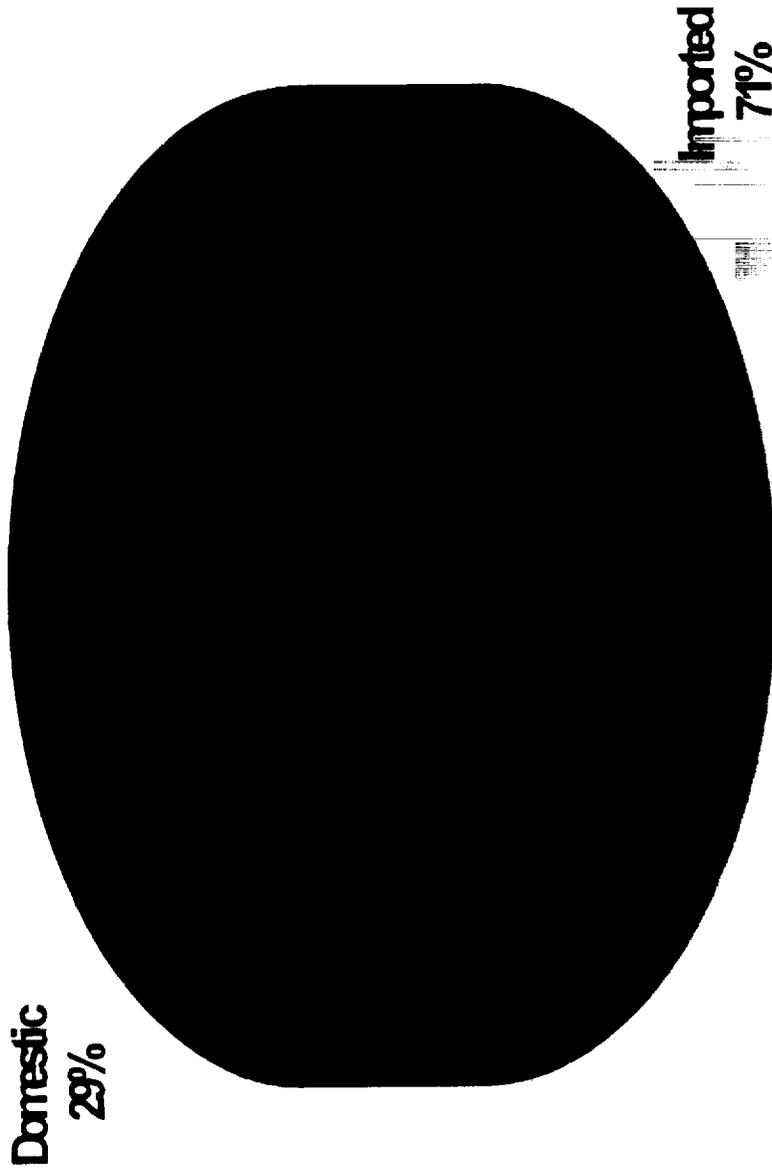
Percentage Distribution of First Hand Sales of Computer Good and Services (1993)





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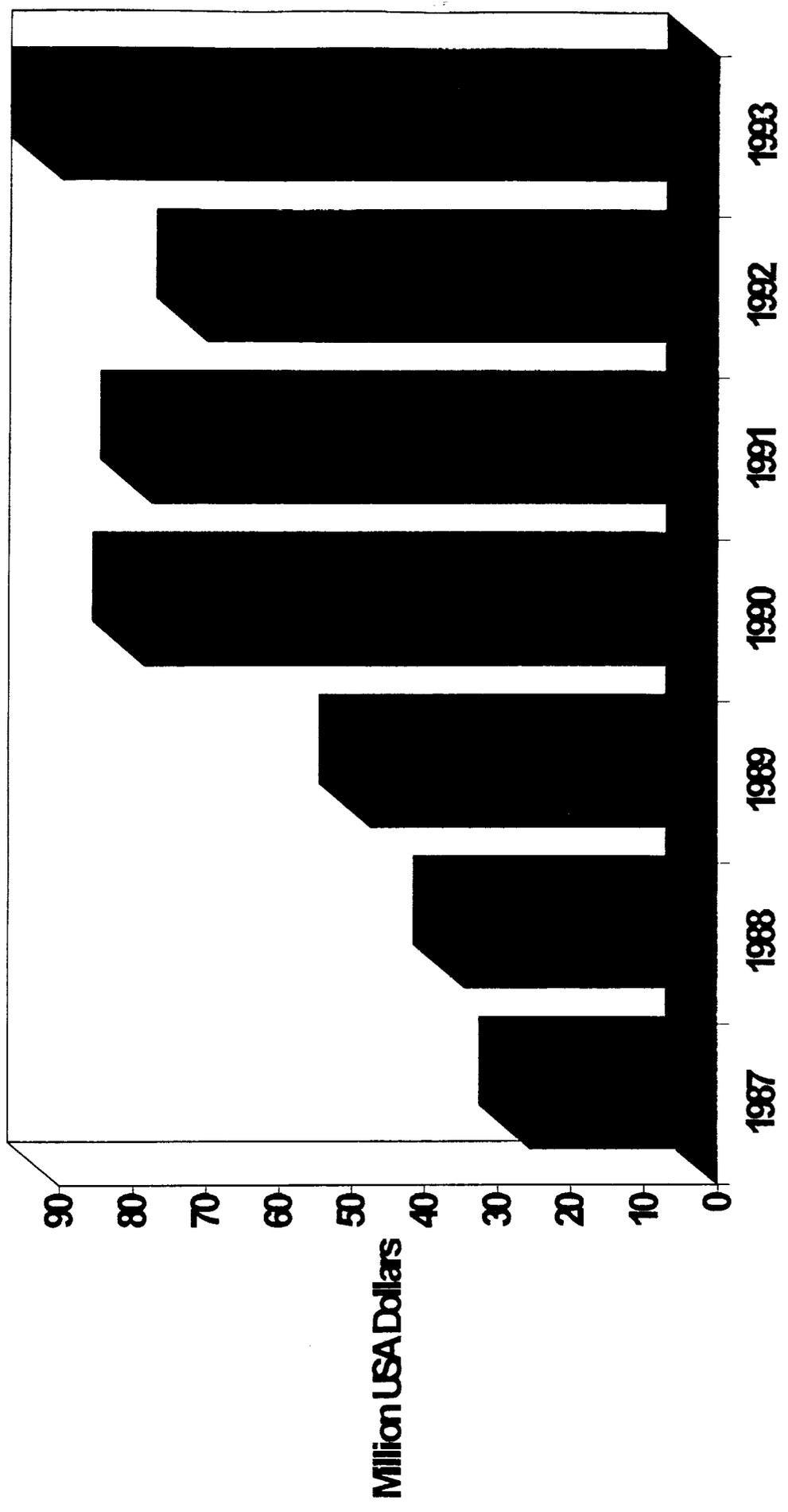
Sources of Software (1993)

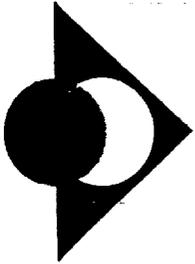


Total Market = 90 Million USA Dollars



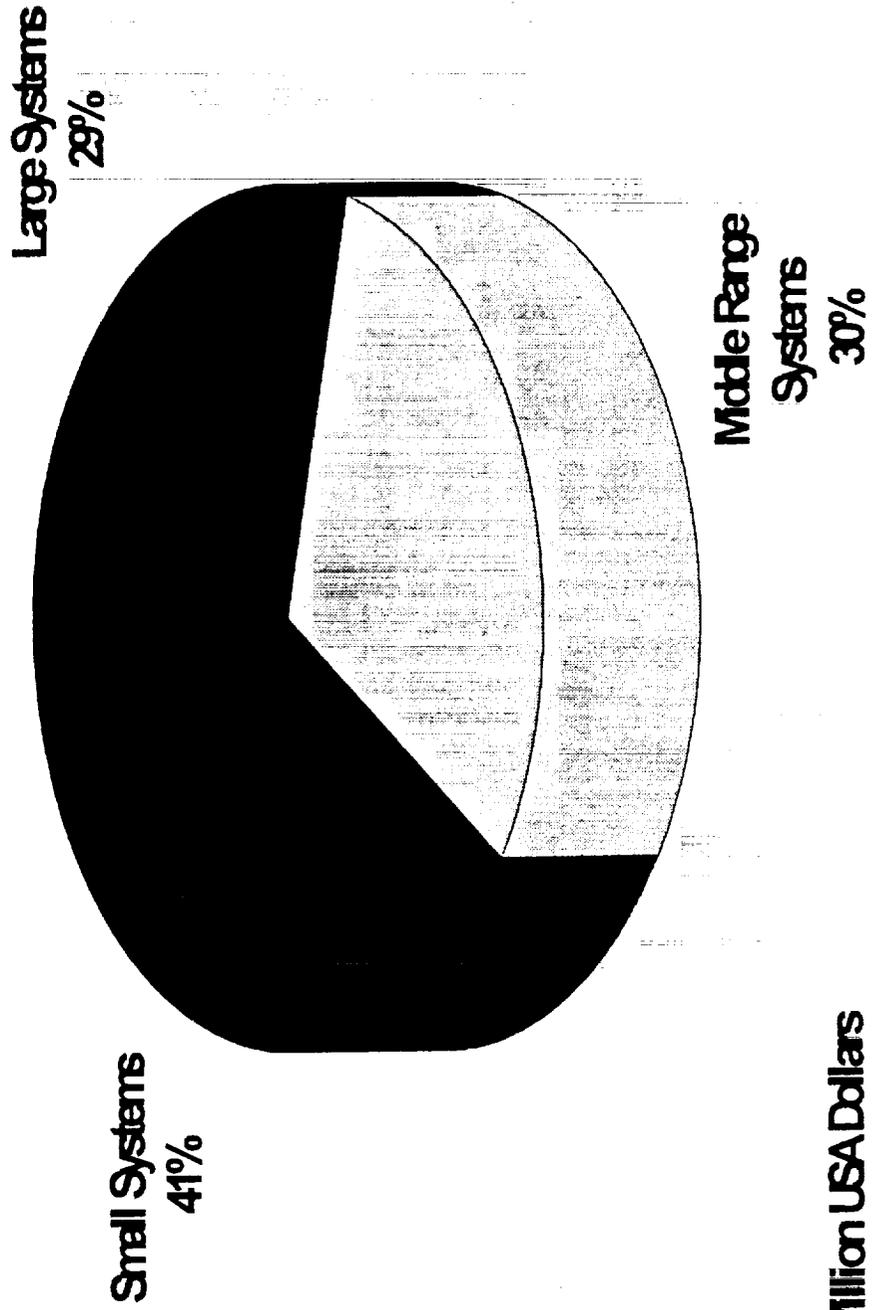
Software Market in Turkey



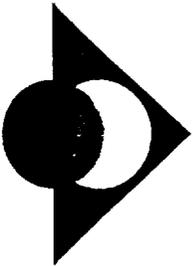


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Market Share of Computer Systems

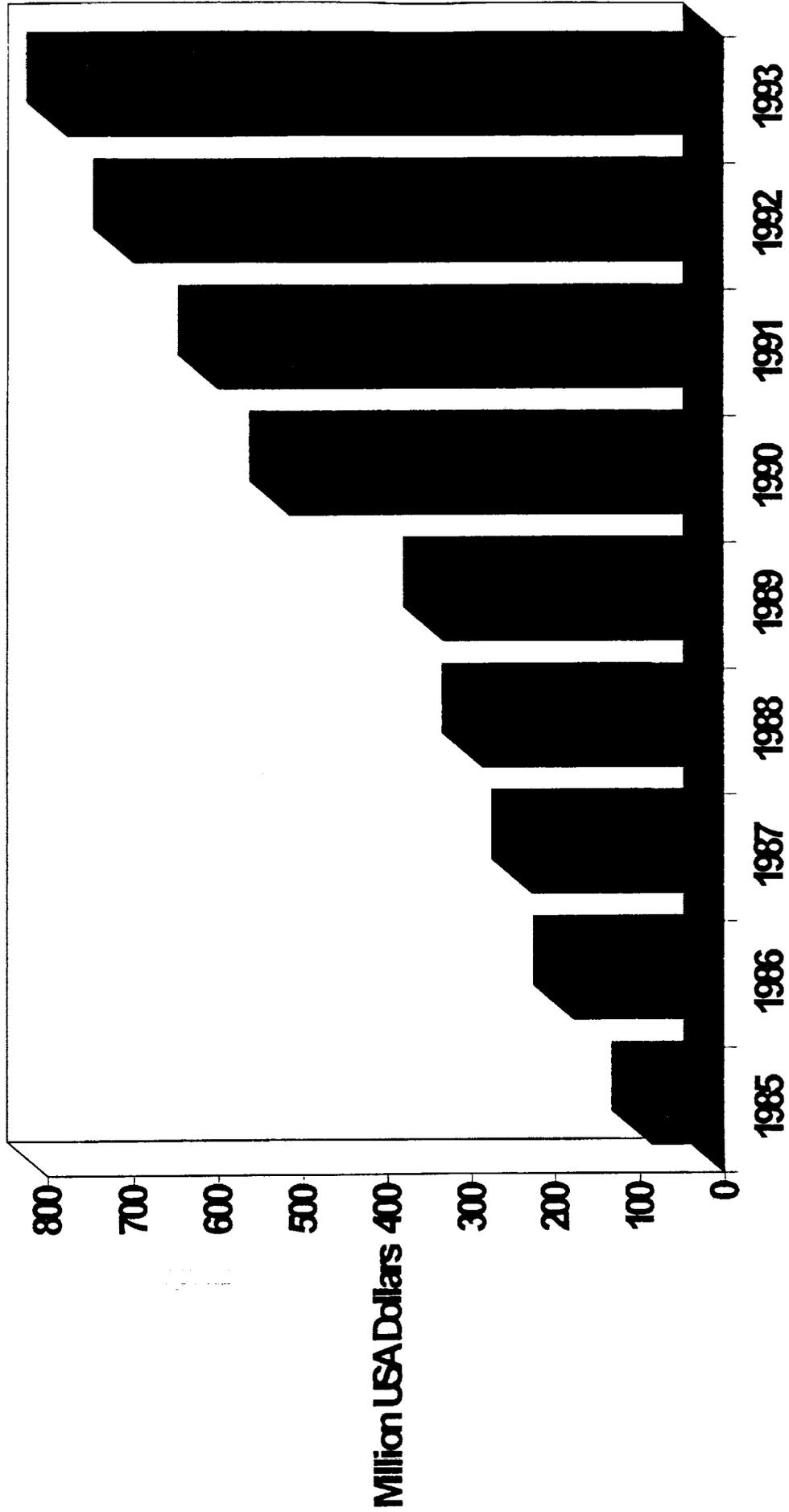


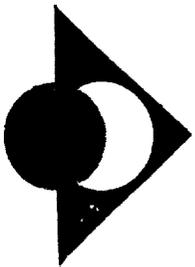
Total=173 Million USA Dollars



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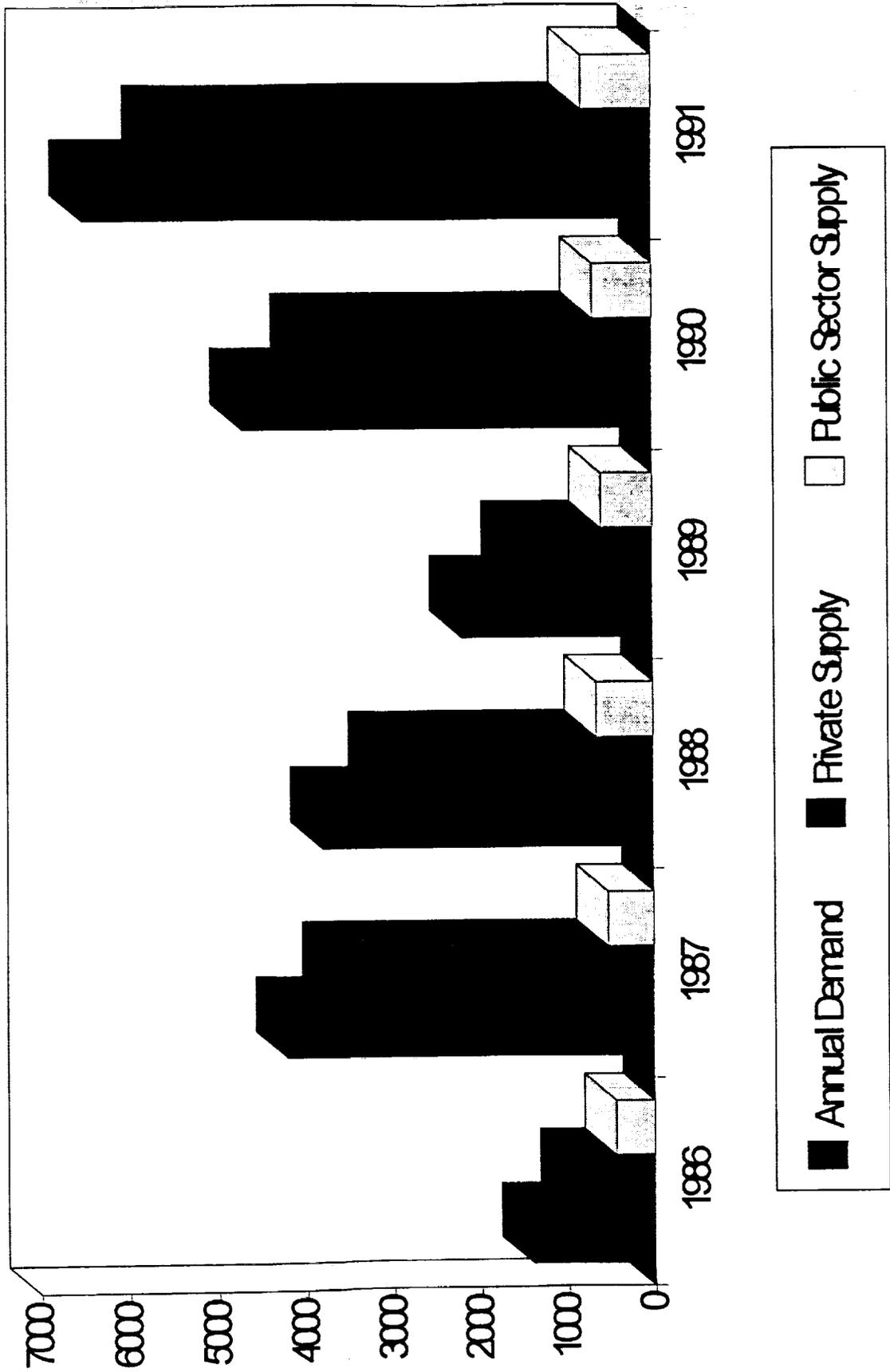
Hardware Market in Turkey

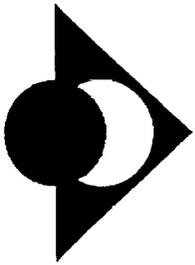




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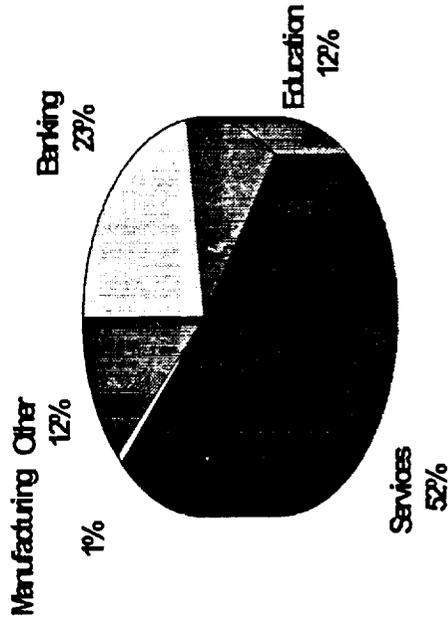
Sources of Informatics Skills



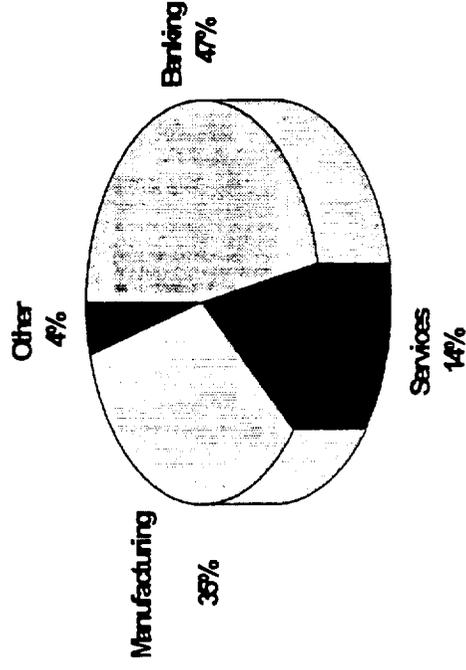


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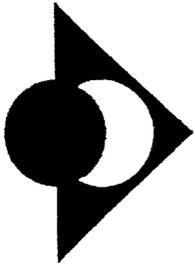
Sector Composition of Demand for Informatics Professionals (1993)



Public



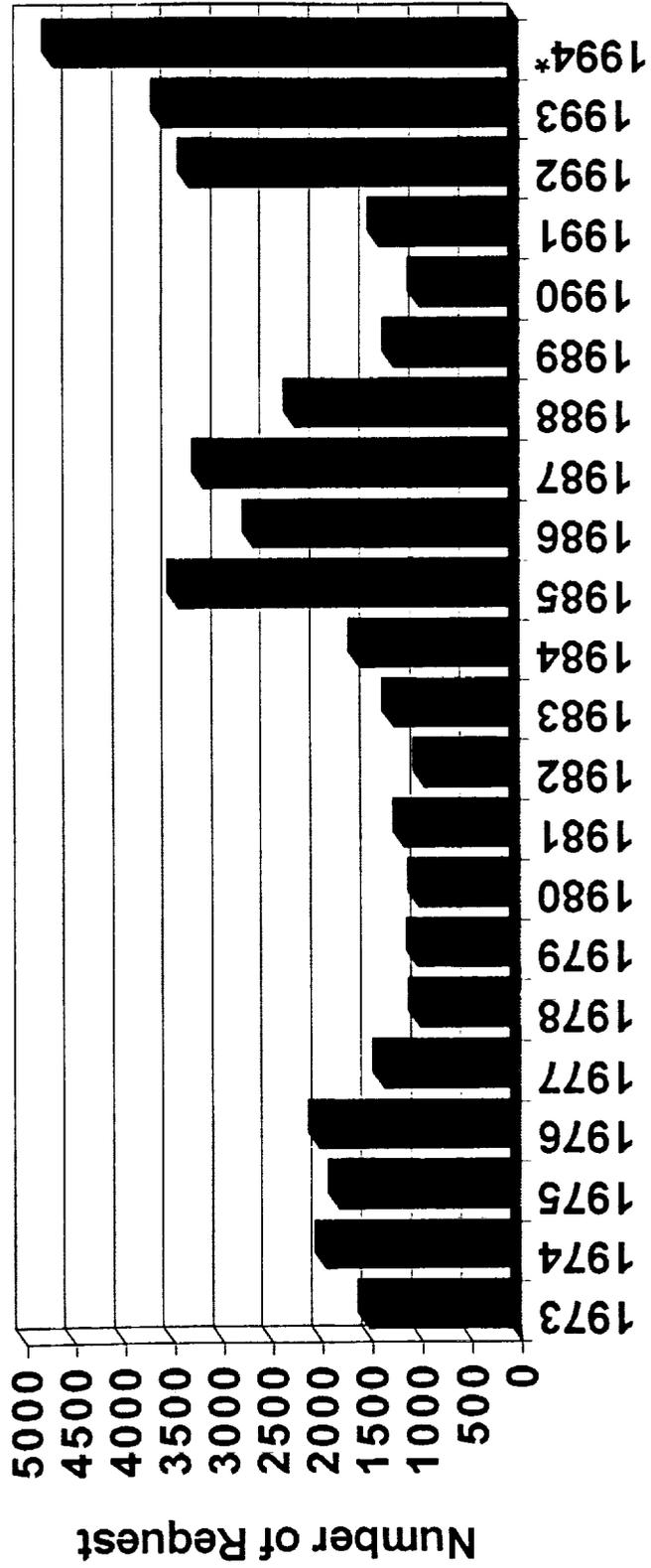
Private

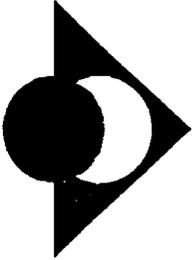


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The Use of TÜBITAK/Information Services Department

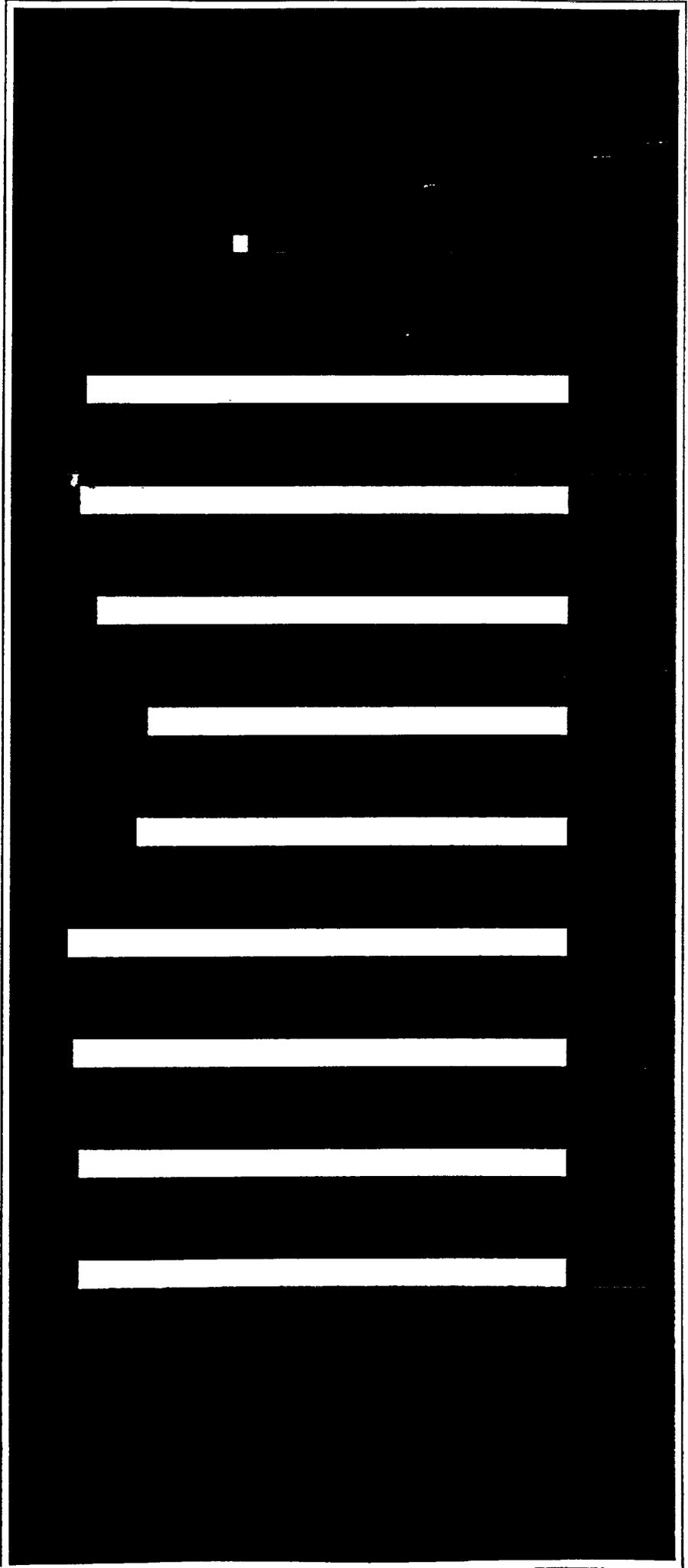
Use of TÜBITAK/Scientific and Technical Information Services Department On-Line and CD-ROM Databases

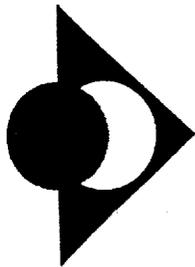




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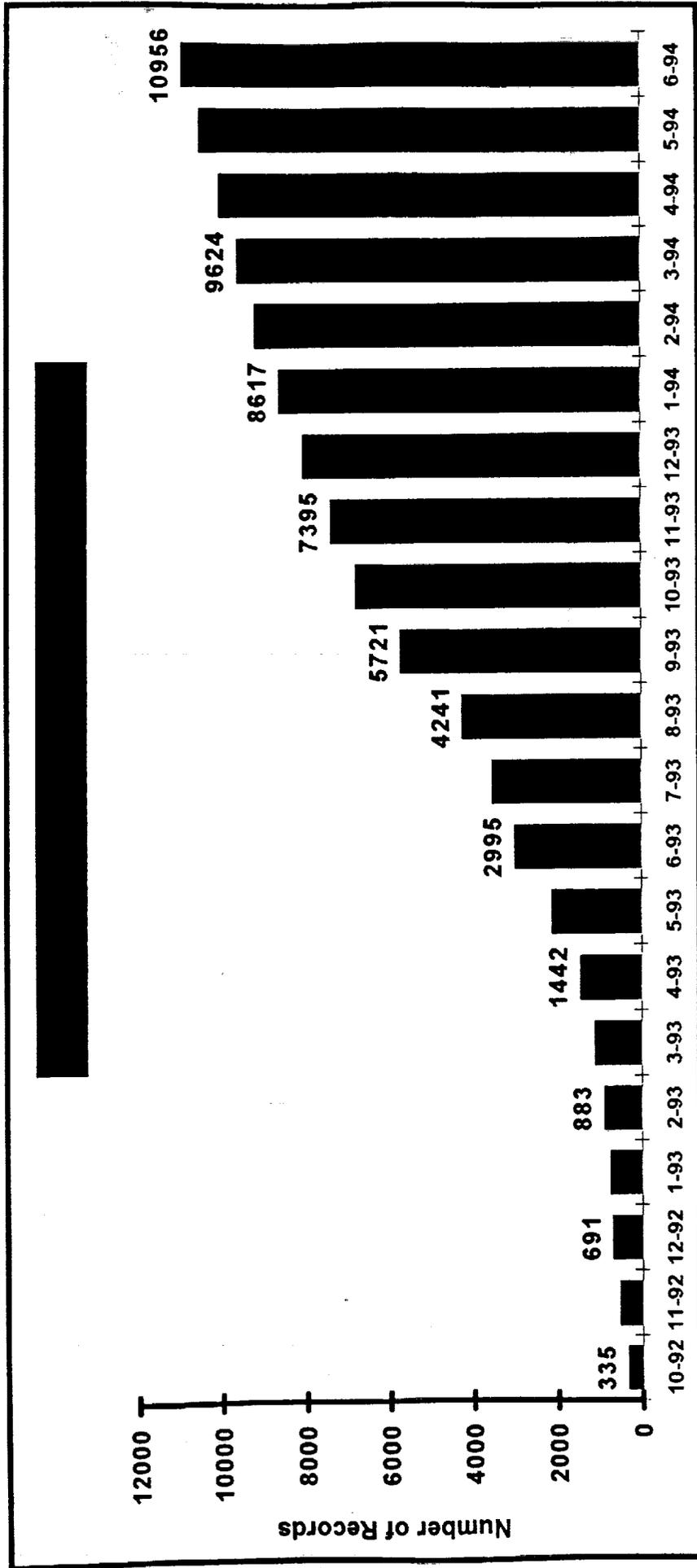
Use Of TÜBİTAK/EHM On-Line and CD-ROM Databases

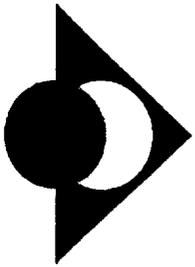




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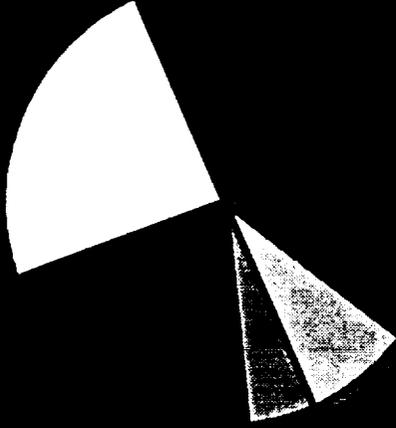
TUBITAK/EHM National Scientific and Technical Databases

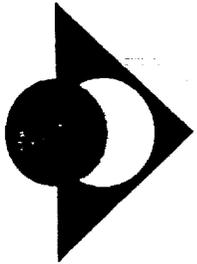




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Distribution of Search Request to TÜBITAK/EHM

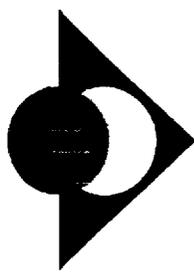




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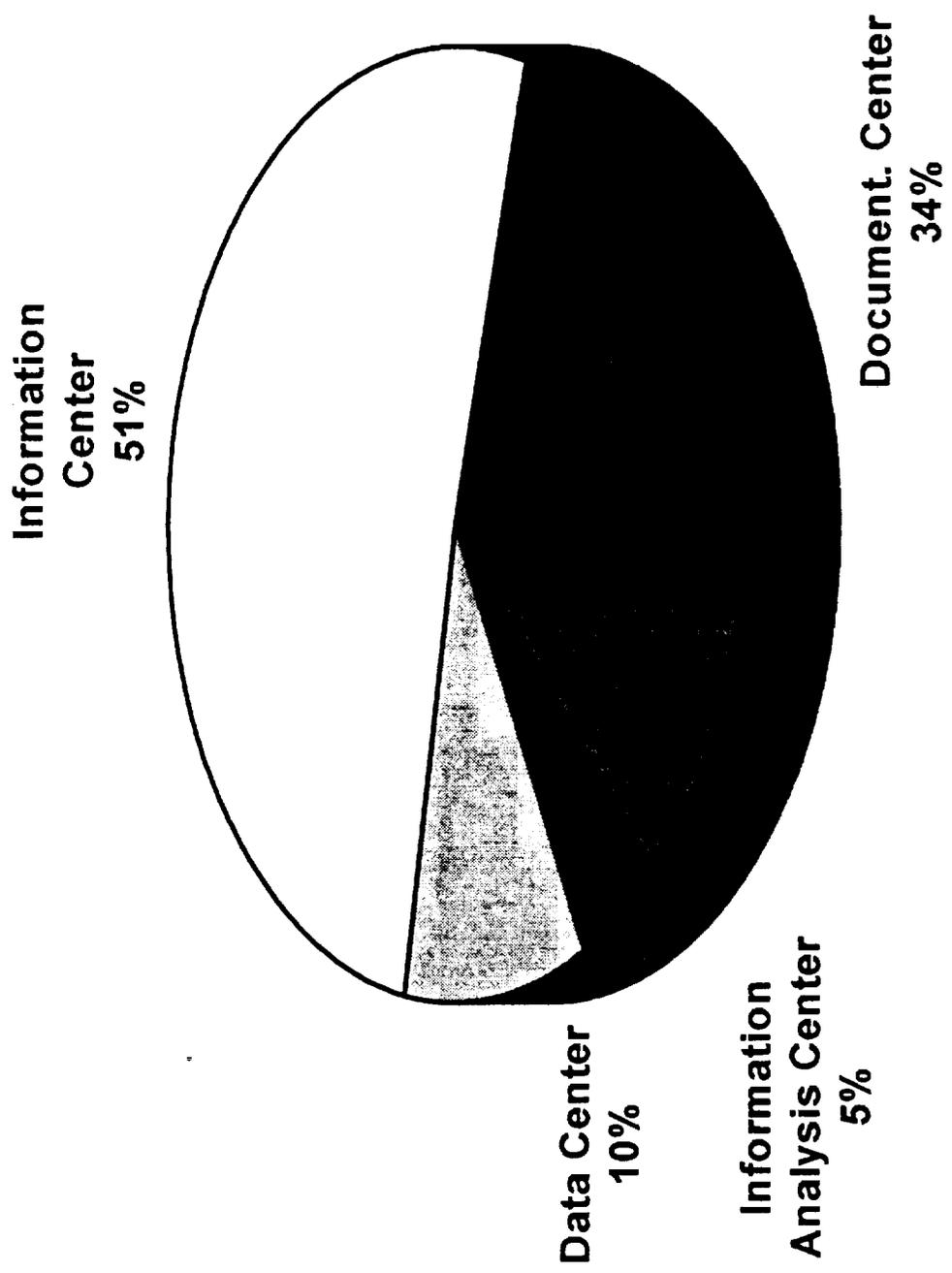
National Survey on Information Activities

- **Number of Organizations:** 324
- **Number of Organizations Responded to the Survey:** 248
(%76)
- **Type of Organizations: All Types**
 - Universities
 - Government
 - Private
 - Societies
 - International



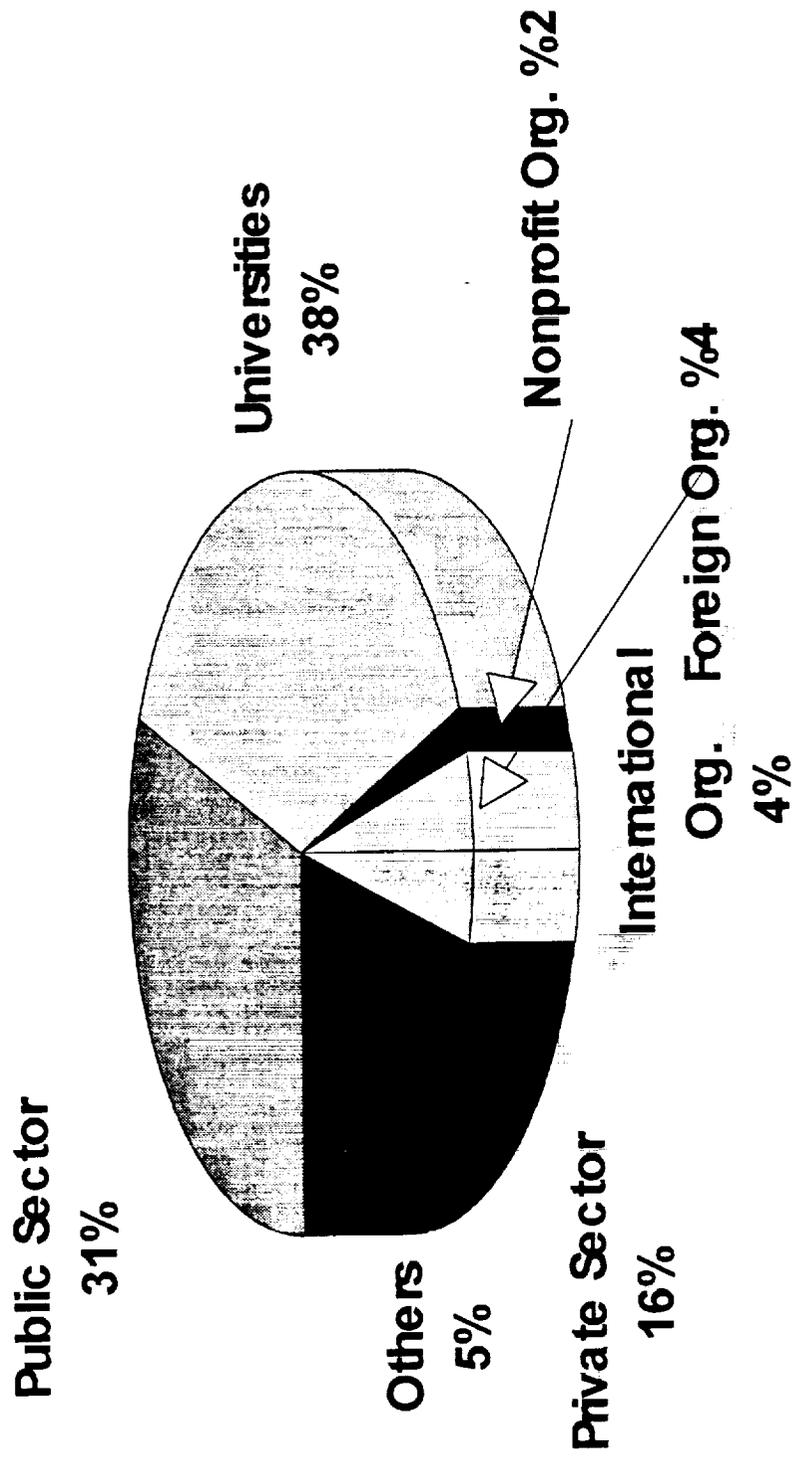
TUBITAK

TYPE OF ORGANIZATION



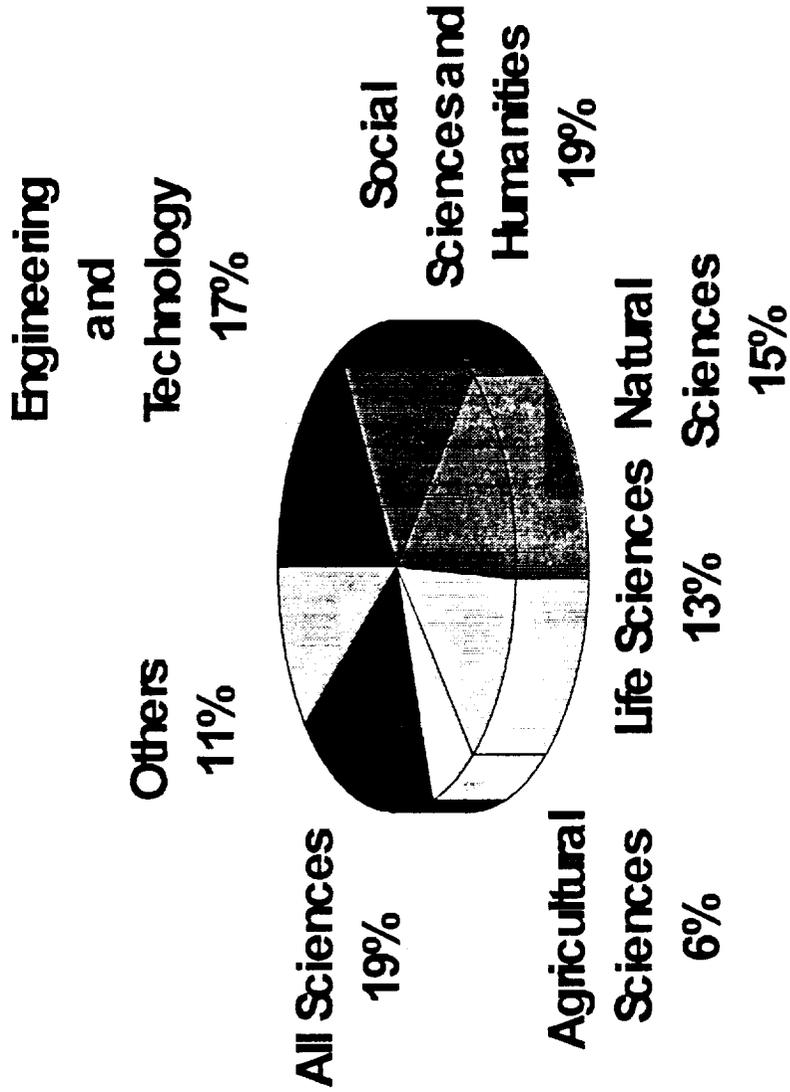


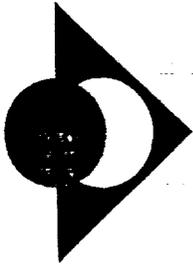
Distribution of Information Centers in Turkey





Distribution of Organizations by Fields of Interest

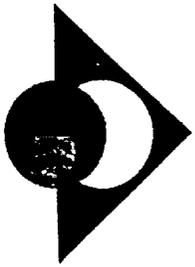




TUBITAK

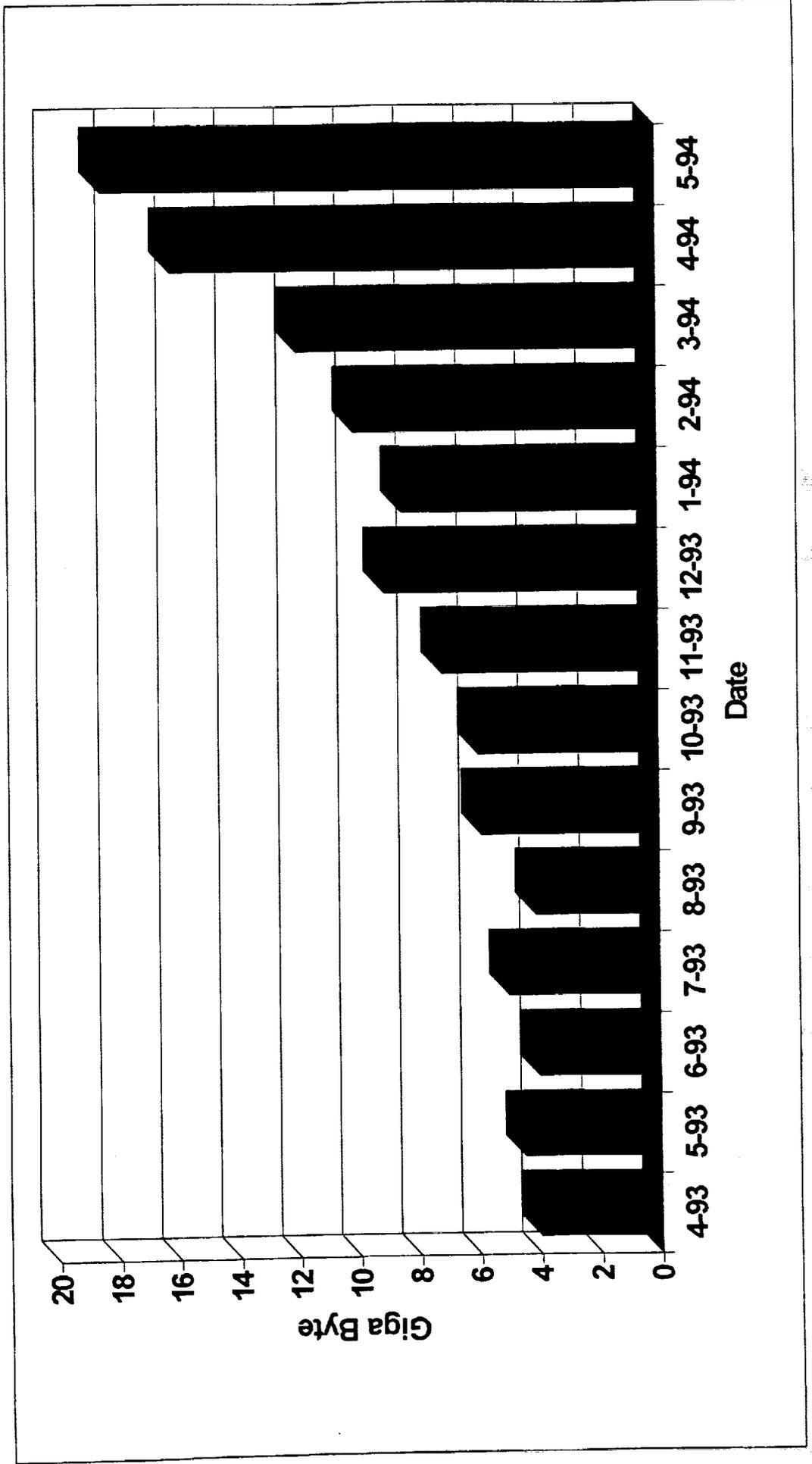
Milestones of TR-NET (Turkish INTERNET Project Group)

- Application to NSF and CERN for the connection (Dec. 1991)
- Acceptance by NSFNET and CERN (March 1992)
 - "Looking to the future, please accept our heartiest welcome to NSFNET family" S. Goldstein (NSF Prog. Dir.)
- Application to PTT for a 64Kbit Line(July 1992)
- Installation of the First Router (Sept. 1992)
- Testing of the Connection (Oct. 1992)
- Availability of PTT 64 Kbit Line (5th April 1993)
- Opening of INTERNET to the Public Use (21rst April 1993)



TUBITAK

Turkey's INTERNET Traffic



1994



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About the Speaker

Ms. Mashatt entered the Federal Government in 1988 as a Presidential Management Intern. She has held numerous positions relating to international trade at the U. S. Department of Commerce. From 1988 to 1990, she was an International Trade Specialist in the Office of Canada during the implementation of the U. S. Canada Free Trade Agreement. During this time, she was detailed to the White House to monitor Canadian compliance with the Agreement. Her next assignment at the Department of Commerce was in Import Administration where she investigated unfair foreign trade practices. In her current position at the Office of Mexico, Ms. Mashatt works on NAFTA implementation issues.

As part of various executive development programs, Ms. Mashatt has had the opportunity to work in other trade related organizations such as the United States Trade Representative's Office, the Treasury Department and the Council of the Americas.

Ms. Mashatt received her Master's Degree in International Relations from the University of Virginia in 1988. She received her bachelor's degree in Political Science from Duquesne University in 1984. She is married and has a son.

